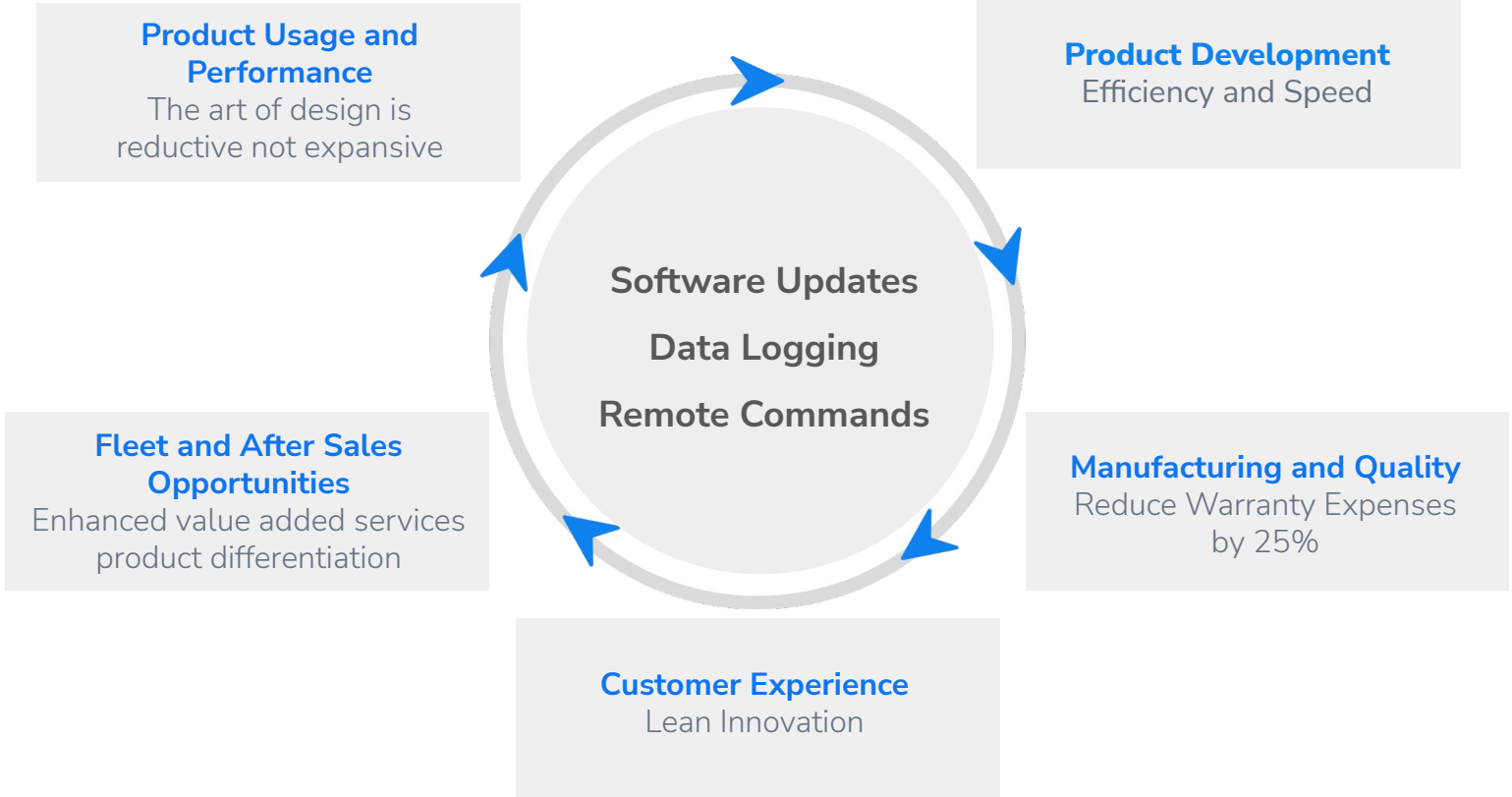
Maximize embedded connectivity value across the full product life cycle

CES January 5, 2023

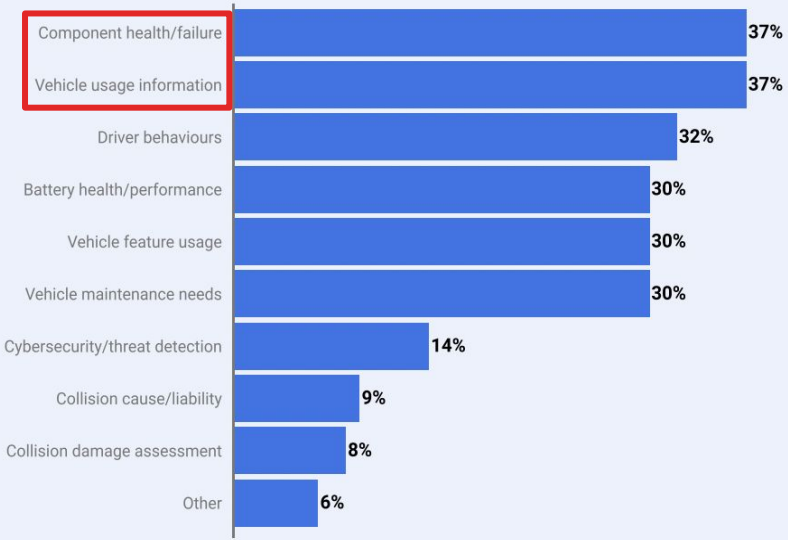
Steve Schwinke, VP Customer Engagement

Embedded Connectivity and The Product Life Cycle

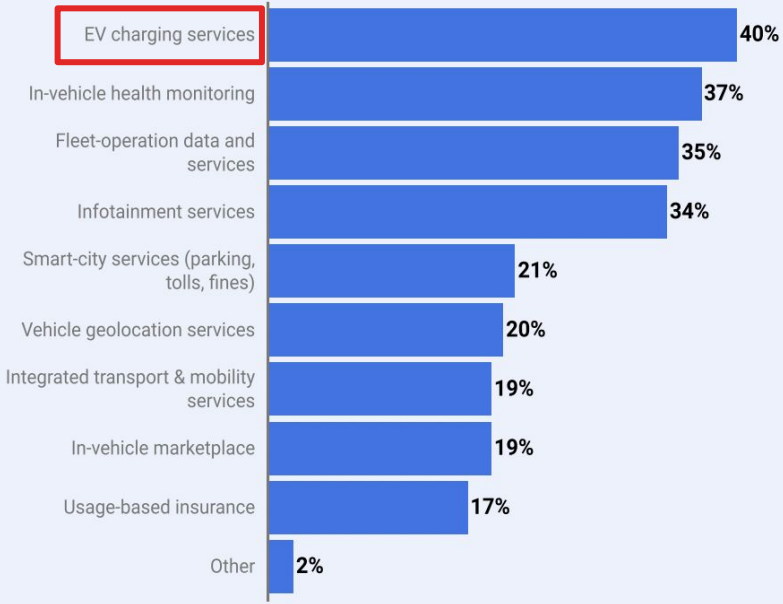


Internal - External Benefits

Which of the following data-mining opportunities will be most important to your company's operations in the next five years?



Which of the following applications offer the best near-term data-monetization opportunities for automakers?



Core Pillars of Value

Better Product

- Vehicle Software Configuration Management
- Deep insights into product usage
- Product improvement with time through software enhancements
- Early detection and containment
- Reductive design

Better Experience

- Vehicle sharing
- Fleet as a Service
- Route Optimization
- Delivery as a Service
- Vehicle maintenance
- Prognostics

Better World

- Improve road safety
- Reduce congestion
- Better access to mobility
- Intelligent energy management
- Sustainability

ADAS Usage of Connected Vehicle Technology

Sense	Perceive	Decide	Actuate
Information from cameras, sensors, and communication	Interpret data	Make the best possible decision based on all available information	Initiate actions
• Data collection from all sensors • Usage of external information	• Improve perception modelling based on real conditions • Identify faults and failings	• Post analysis of decisions • Create a bug fix or enhancement	• OTA updates to improve existing software • Measure outcomes including false positive or false negatives

Deep Connected Platform

Rest APIs

aws

Rest APIs

SaaS Applications

Deployment Manager
Scalable software update & ECU calibration rollouts and rollbacks

Inventory Manager
All software packages, versions, ECU calibrations & vehicle configurations.

Datascope
Visualization of vehicle events, time-series plots & diagnostic data

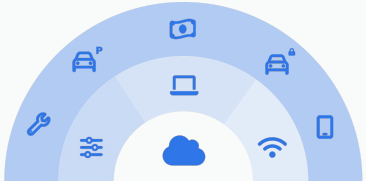
Command Center
Configure and send remote executable or diagnostic commands from cloud to vehicles

Sibros Armor

Military grade OTA cybersecurity

OEM Applications

EOL Testing
Digital Experience
Electric Charging
Fleet Management
DRM Integration
Back Office / ERP



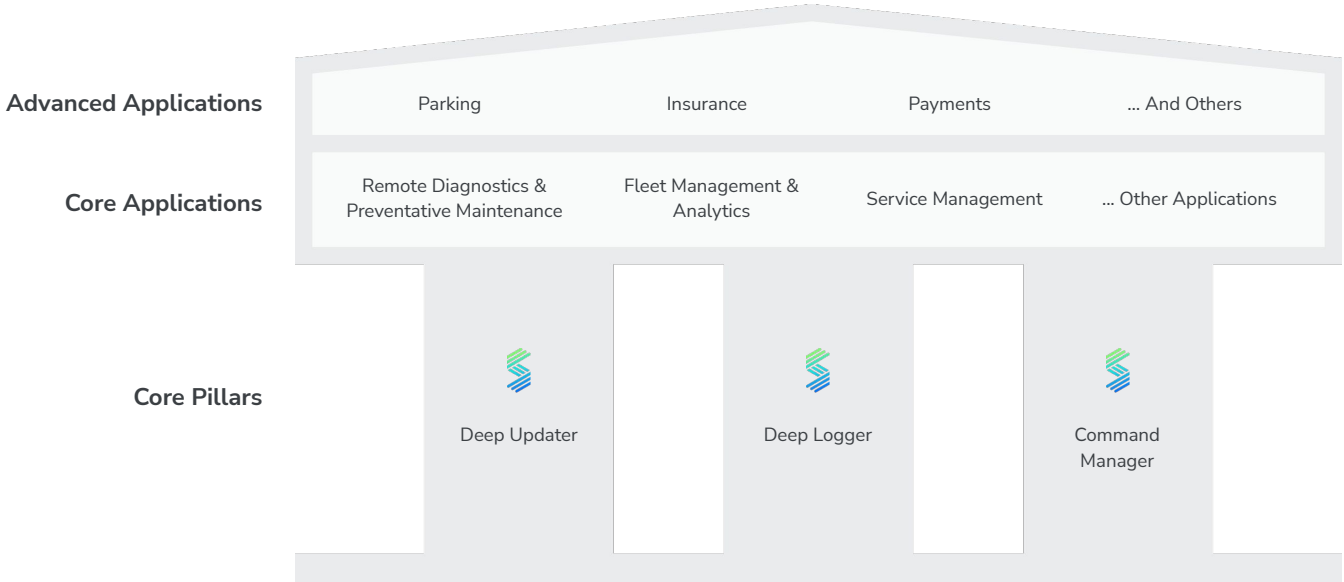
In-Vehicle Products

Deep Updater
OTA software updates to all components and sensors in the vehicle

Deep Logger
Highly selective data collection, with the ability to record all in-vehicle signals

Command Manager
Send commands to any in-vehicle controller for basic functionality or to run tests and routines

Getting More Value from Embedded Connectivity with Sibros & AWS



SIBROS

aws

The art of possible

SONO MOTORS

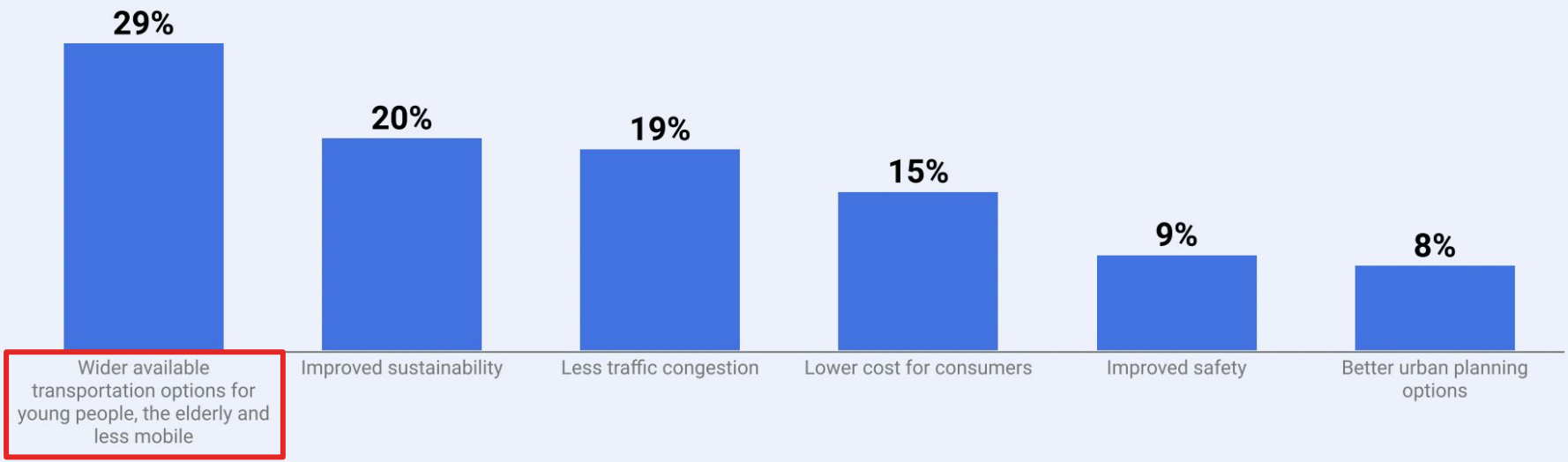

Lightyear One


BAJAJ


VOLTA ZERO
VOLTA
ZERO
BRIDGESTONE

Societal Benefits

What will be the biggest societal benefit from the transition to new mobility methods of transportation (car sharing, ride sharing, ride hailing, micro-mobility [bikes, scooters])?



Use Cases

Design, Testing & Manufacturing

Automated Simulation Testing

Log data from critical systems (e.g. high-voltage batteries) to create simulations, characterize battery cell and thermal properties, perform fault-injection testing or model thermal footprint

EOL Testing

Leverages live connected vehicle data and remote diagnostics to perform final EOL production testing and validation

Rapid Prototyping

Perform remote validation and testing for rapid beta bring up and prototyping

Cost Modeling

Log real world data in the field to to build accurate vehicle operational and cost modeling datasets

Proving Grounds Testing

Collect high precision microsecond level data from all components during proving grounds testing for cold/hot weather, high/low speed, on/off road track, etc

Reductive Design

Improve future designs with product usage insights from connected vehicle data to eliminate underutilized features or functions

Maintenance & Services

BMS Optimization

Collect targeted vehicle data for battery engineers to improve BMS algorithms (e.g. range estimation or battery life prediction)

Fleet Analytics

Connect various vehicle makes and models across multiple brands and regions on the same platform for centralized view of fleet asset health and monitoring

Recall & Warranty Claim Avoidance

Sense, detect and fix common component defects (cameras, parking, braking) with OTA software updates before recalls are triggered or enforced

Service Scheduling

Send targeted alerts to users based on vehicle health status and auto-schedule regular or recommended maintenance services at dealers with DMS integration

Warranty & Parts Management

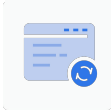
Single view of all vehicle health data to optimize work orders, spare parts and service management for suppliers, partners, dealers or fleet owners

Connected Diagnostics

Perform remote or assisted repairs with real time DTC fault analysis over-the-air

IVI OS, Media App & TCU Updates

Update or reflash IVI OS, maps, media apps, TCU/Gateway hardware software



Recall Campaign Orchestration

Accelerate recall campaign notification and remedy times with targeted vehicle group OTA software update rollouts

Vehicle Health Monitoring

Monitor total vehicle health (chassis, battery management system, powertrain, thermal, ADAS, etc) for preventative maintenance, recharge scheduling or vehicle warranty lifecycle management

Core ECU Updates

Update, reflash or calibrate 80+ core ECUs across all domains, components and controllers on-demand or in staged rollouts to target vehicle groups by meta data, VIN, location/region

Preventative Maintenance

Analyze diagnostics (DTCs or alerts) for specific components across fleets to reduce part failures, reduce downtime and increase vehicle lifespans

Recharge Scheduling

Manage and schedule the recharging of your entire fleet to reduce charging costs and decide when each vehicle starts charging

Vehicle Prognostics

Aggregate prognostic data in the cloud to improve predictive failure detection models, reduce warranty claims or minimize fleet downtime

Digital Experience

Connected Mobile App

Pre-built smartphone companion app with embedded connectivity to all vehicle systems for robust connected mobile app experience

Group Trips & Rides

Track where other vehicles are en route to final destinations for social and group trips, rides or vacations

In-Vehicle Commerce

Payments for fuel, recharging, parking and other services (drive-through food orders) via IVI systems or connected vehicle app

Phone-as-a-Key

Unlock, lock, start and drive vehicle without traditional key FOB

Continuous Maps Updates

Continuously keep maps and traffic aware navigation systems updated for any region

In-Car Package Delivery

Integrate with 4PL/food delivery services to unlock/lock vehicle for package-to-trunk or in-car deliveries

Location Tracking

Improve fleet productivity or share arrival/delay times with GPS/GNSS based vehicle positioning on maps

Route vs Range Optimization

Optimize navigation routes based on available range to minimize EV re-charge or ICE re-fueling stops

Vehicle Personalization

Adaptive Air Suspension

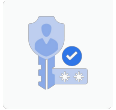
Offer improved experience by allowing drivers to to choose a softer or firmer ride with adaptive air suspension and adjusting ride height

Configure Drive Modes

Send commands over-the-air to calibrate the powertrain and customize vehicle acceleration handling based on localized driving environments and terrains

EV Charging Options

Launch vehicles with Level 1 (120V) charging then enable 240V post-sale with simple OTA software updates



Vehicle Personalization

Update look and feel of maps, infotainment, cluster UI/skins or interior lighting based on user preference, region, time of day, season, weather conditions, etc.

Ride Preconditioning

Trigger commands to pre-heat the battery pack or turn on the cooling pump during extreme temperature conditions

Cabin Preconditioning

Trigger commands to pre-heat or pre-cool cabin temperature during extreme temperature conditions

Energy Efficiency Analysis

Analyze fuel/energy consumed vs mileage over weekly/monthly/yearly intervals at the vehicle level and fleet level

Extend Vehicle Range

Extend vehicle range with BMS algorithm OTA software updates or via remote commands to conserve energy (e.g. limiting power of climate control systems)

Load Based Suspension Handling

Based on the carrying load data logged, send commands to distribute weight between front and rear axles for customized suspension handling and performance

Monetization & Mobility Models

Vehicle-as-a-Service

Manage vehicle locations, mileage limits, remote roadside assistance, payment services, usage-based insurance, OTA maintenance

Paid Feature Upgrades (After-Sale)

Enable (after-sale) paid feature and performance upgrades with OTA updates (memory-based parking, charging option levels, ADAS features, heated seats, steering, lights, WiFi upgrades, etc)

Usage Based Insurance

Provide connected vehicle data to enable Usage Based Insurance (UBI) models such as Pay-How-You-Drive or Pay-Per-Drive using driver behavioral data, history and scoring

Car-Pooling & Sharing

Enable car sharing capabilities with location based services for routes driver segmentation

Trucking-as-a-Service

Facilitate Trucking-as-a-Service business models with trip data, driver behavior monitoring, location tracking and connected diagnostics for remote/assisted repairs

Safety

ADAS Bug Fixes

Fix ADAS software bugs and defects over-the-air for auto emergency braking, forward collision detection algorithms and more

Crash Analysis

Determine the number of seat belts deployed, brake position, airbags, steering position before, during and after impact

Emergency SOS

Use live connected vehicle data to improve emergency response times and assist in damage control with data for airbag triggering, acceleration, crash impact times, brake speed and location

Roadside Assistance

Dispatch help more efficiently or perform remote assistance needed using live connected vehicle data and diagnostic codes for roadside assistance requests

ADAS Performance Improvement

Collect real world vehicle data to to improve ADAS performance (reduce false positives, improve haptic/audible feedback mechanisms, collision detection, etc)

Driver Behavior Analytics

Log and monitor driver behavioral data (speeding, drowsiness, use of cell phone) with real time alerts

Geofence Alerts

Set geofence boundaries with automated mobile app alerts for parental, fleet or car sharing control

Theft Protection

Enable advanced theft protection with location tracking, remote immobilization, geofenced boundaries or inertial sensor alerts (e.g. vehicle moved but not started)

Visit Sibros at CES this week in Booth **#3466**

Thank you!

Steve Schwinke
VP of Customer Engagement
sschwinke@sibros.tech